MAP, PLAN AND REPORT

DRAFT REPORT

FOR

THE TOWN OF JOHNSBURG

Warren County
New York

NEW YORK STATE OF OPPORTUNITY. | Department of State

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2 PROJECT PLANNING

2.1 Purpose and Scope

The existing Hamlet of North Creek does not contain a centralized wastewater system; this lack of infrastructure has been noted as a limitation for growth in the area. In 2014 a grant was awarded by the New York Department of State to investigate the potential for a centralized wastewater system. The following document outlines the initial planning, alternative screening, cost-estimation, and design of a centralized wastewater treatment system for the Hamlet of North Creek. Specific objectives of the following Map, Plan, and Report are: (1) determine the boundary of a wastewater sewer district with input from the community, (2) determine the hydraulic and organic loading of the proposed sewer district, (3) screen potential locations for a centralized wastewater system, (4) select a treatment system for the sewer district, and (5) provide cost estimations for the collection system and treatment system based upon a preliminary design.

2.2 Location

The Hamlet of North Creek is located in the northeastern portion of the Town of Johnsburg, in Warren County, New York. The Hamlet is located between the Hudson River to the east and NY Route 28 to the west. (See Appendix A, Figure A-1). The Hamlet is located in the southern Adirondack Park, northwest of the Lake George area. The Hamlet supports season long tourism, with winter activities centered around neighboring Gore Mountain Ski area. In addition, the Saratoga and North Creek Railroad (a heritage railway operating between North Creek and Saratoga Springs) bring visitors to the Hamlet year-round.

2.3 Environmental Resources Present

2.3.1 Topography

The Hamlet area is generally mixed topography, with a general slope from west to east from NYS Route 28 to the Hudson River. Along the river there is a rapid grade transitions to meet the water surface. The Hamlet contains some minor grade changes due to historic development and local topography. The most significant grade change is around the North Creek, which splits the Hamlet area. The topography of the site will require segmentation of the collection system and in-depth analysis to maximize the use of a gravity collection systems. It is likely that pumping of wastewater will be required as topography will not allow for draining to one area. The area topography is presented in Appendix A, Figure A-2.

2.3.2 Geology

The area is located in the Adirondack Park where bedrock and sand/gravel deposits dominate the local geology. In general, mountainous areas and areas with steeper slopes have shallow depths to bedrock. Alternatively, flatter areas and areas adjacent to existing rivers have sand or gravel deposits overlaying the bedrock formations. These sands and gravels are highly permeable and

can have a significant depth to bedrock. A majority of the Hamlet is located over sand and gravel deposits; however, there are isolated areas of exposed bedrock or large subsurface boulders. Based upon observed geology, the wastewater system design will not be significantly impacted by the subsurface geology; however, isolated areas of ledge may impact the final wastewater system location.

2.3.3 Hydrology

The area has significant underground water resources. Groundwater generally flows from surrounding mountain areas to Hudson River through the extensive sand and gravel deposits. Drinking water for the Hamlet and several residences outside of the Hamlet is provided by wells located in these deposits. The local hydrology is critically important for water supply and should not be impacted by the proposed wastewater treatment system. Of special note are the existing water supply wells for the North Creek Water District as indicated in Appendix A, Figure A-2.

2.3.4 Wetlands

Wetlands information was taken from the United States Fish and Wildlife Service, New York State Department of Environmental Conservation, and Adirondack Park Agency. Several dispersed wetlands are present in the Hamlet area, with most of the wetlands adjacent to the North Creek or Hudson River. A majority of the wetlands are Freshwater Forested/Shrub wetlands. The location of the wetlands is not anticipated to have a major impact on the design of the wastewater district or wastewater treatment area as few wetlands are located within the Hamlet area. Wetland maps are presented in Appendix A in Figures A-3A thru A-3C.

2.3.5 Floodplains

The Federal Emergency Management Administration (FEMA), Flood Insurance Rate Maps for the Town of Johnsburg shows the extent of the Hudson River and North Creek 100-year floodplains. The mapping indicates the 100-year floodplains are generally located adjacent to the Hudson River and North Creek, with minimal intrusion into the Hamlet area. The floodplains do limit the location of a wastewater disposal system to areas elevated above the nearby waterbodies. A map of the 100-year floodplains in the Hamlet area is shown in Appendix A, Figure A-4.

2.3.6 Soils

Soils in the Hamlet area are varied; however, the area is primarily composed of sandy soils with occasional areas of exposed ledge. The Town of Johnsburg owns and operates a parcel of land used as a highway garage and sandpit for the Hamlet area. Based upon observations at this site, soil mapping, and general topography of the area it is likely that the majority of the area is comprised of highly permeable sands. These highly permeable soils serve as a water source for the municipal water system for the Hamlet as discussed in section 2.3.3. A soils map of the Hamlet area is shown in Appendix A, Figure A-5.

2.3.7 DEC Water Quality Classification

The DEC water quality classification is shown in Appendix A, Figure A-6. The Hamlet area is located adjacent to the intersection of the Hudson River and the North Creek. The Hudson River is classified as C(T) for the section adjacent to the Hamlet area, and the North Creek is classified as a C(T) stream. These classifications require specific limits on the quantity and quality of wastewater discharged to nearby waterbodies if surface discharge is required. Based upon these conditions the wastewater treatment system should avoid surface discharge, unless the discharge can be located to avoid impacts to the receiving waterbody.

2.3.8 Natural Communities

A map showing the presence of natural communities and is presented in Appendix A, Figure A-7. The project area does not have any areas of significant natural communities; however, a portion of the project area is located within the boundary areas surrounding significant natural communities. The existing natural communities located adjacent to the Hudson River and other environmental areas may limit the possible wastewater system locations.

2.3.9 Historic Resources

The Hamlet area has several historically significant buildings and locations. A map of the historically significant components is shown in Appendix A, Figure A-8. Historic resources will not impact the type of wastewater system selected; although they may limit the final location. Should locations be identified for wastewater system, historical surveys should be performed during the environmental review to determine presence or absence of historic sites. A list of historic resources in the Hamlet area is summarized in Table 2-2-1. It is not anticipated that historic buildings will limit the location of wastewater treatment facilities or the type of treatment used; however, the internal wastewater piping of historic buildings will impact the design of the collection system.

Table 2-2-1 - List of Historic Resources in Hamlet Area

USN	Name	Status
11306.00001	North Creek Railroad Station Complex - Railroad Pl	Listed
11306.00005	Owens House Gallery & Museum Store - 313 Main Street at Railroad Place	Undetermined
11306.00009	Motel - 1-story/14 tourist units - 264 Main St	Not Eligible
11306.00009	2-story commercial building - 272 Main St	Not Eligible
11306.00009	3-story commercial building - 274 Main St	Not Eligible
11306.00009	1-story commercial building - 302 Main St	Not Eligible
11306.0001	2-story/side-gabled residence - 41 NY 28 N	Not Eligible
11306.0001	Town of Johnsburg Library - 219 Main St	Not Eligible
11306.0001	Waddell house, frame residence - 52 NY 28N	Eligible
11306.0001	house - 1 Circle Ave	Eligible
11306.0001	house - 2 Circle Ave	Eligible
11306.0001	Owens House Gallery & Museum Shop - 312 Main St	Undetermined

11306.00011	St James Catholic Church - 239 Main Street	Undetermined
11306.00011	United Methodist Church - Main Street	Undetermined

2.3.10 Tax Maps

A map of the property parcels in the Hamlet area is located in Appendix A, Figure A-9. The Hamlet area is primarily composed of small lots for single-family residences. Several of the existing parcels do not meet the isolation distance requirements for new wastewater disposal systems. The small lot sizes would make the use of several decentralized wastewater treatment systems to serve the Hamlet area difficult. A centralized wastewater system would be best suited for treatment of the Hamlet area.

2.3.11 Existing Zoning

A map of the existing zoning is presented in Appendix A, Figure A-10. The Hamlet area is primarily zoned for business uses, residential uses, and public facilities. The project area spans several zoning districts in the Hamlet area. No zoning regulations were found to impact the location or treatment system type of a wastewater treatment system for the hamlet area.

2.3.12 Proposed Zoning

No proposed modifications to the existing zoning maps are known at the time of this report.

2.3.13 APA Land Use Classification

The Adirondack Park Agency designates a majority of the project area as Hamlet. Adjacent to the project area is a portion of Low-Intensity use areas. To simplify permitting requirements, the proposed wastewater treatment system should be located in an area zoned as Hamlet or in other zoning areas with less stringent controls. A map of the APA designated lands uses is presented in Appendix A, Figure A-11.

2.3.14 Regional Plans

The regional plans prepared by Warren County identify the Hamlet as an area of concentrated growth for the region. The Town of Johnsburg is part of the First Wilderness Heritage Corridor, a scenic corridor based around the Saratoga to North Creek railway. The plans for the corridor calls for the development of North Creek into a centralized tourism area as it is the end of the rail line. Regional plans indicate that no centralized wastewater system has been a limiting factor to development in the Hamlet; however, the location and selection of a wastewater treatment system should not impact North Creek as a tourism center. The centralized wastewater treatment system should not be located in a tourism sensitive area, additionally the treatment system selected should not create conditions (odors, increased traffic, visual impacts, etc.) that will impact tourism.

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2.4 Population Trends

2.4.1 Population Data

North Creek is defined as an un-incorporated Hamlet within the Town of Johnsburg. The Hamlet is primarily residential and has several small to moderately sized businesses and restaurants, but does not have any major industrial centers. The Hamlet area is currently served by a municipal water system.

Little information on the historic population of the Hamlet area is available. As of the 2010 Census, there are 616 permanent residents living in the Hamlet. The permanent population is supplemented by seasonal visitors, who partake is both winter and summer recreation.

Based upon trends the permanent population is relatively stable; however, the population is supplemented by seasonal visitors. Investment by the Town, private individuals and the State of New York has increased tourism in the area over the past ten years. Additional investment is anticipated in the future, and the development of a centralized wastewater system is projected to increase investment in the area by removing barriers to development. The growth to seasonal tourism is difficult to document and predict; however, it is reasonable to assume that population will increase in the area over time.

2.4.2 Concentrated Growth Areas

Redevelopment in the Hamlet area has increased with several new businesses supplementing the existing local businesses. Major institutions in the Hamlet area include the school, Town Hall, a supermarket, hotels, shopping areas, a laundry, and restaurants. It is anticipated that this growth will continue within the Hamlet area.

In addition to the Hamlet area there are two other areas of anticipated growth: Gore Mountain Ski Resort and the existing Front Street Development. Gore Mountain Ski Resort, owned and operated by the Olympic Regional Development Authority (ORDA), is primarily a day-use ski center during its six-month snow ski season. During that season, the mountain experiences its highest wastewater flows. ORDA is actively promoting increased shoulder-season events at Gore Mountain. The Front Street Development provides slope-side residential facilities and anticipates a full-service complex in the future.

Please see Appendix A, Figure A-12 for a map of the areas of concentrated growth.

2.5 Community Engagement

The proposed wastewater system is being developed with a grant from the NYS Department of State through the First Wilderness Heritage Corridor. As part of the grant funding public meetings shall be held to discuss the planned area. Preliminary to the public meetings a Wastewater Advisory committee was developed. The committee was selected by the Town of

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Johnsburg and includes members of the business, and residential community. The committee has given guidance on the sewer district boundaries, siting of the treatment facilities, and potential areas of interest from the community.

Following the preparation of the Map Plan and Report a public meeting will be held to present and review a draft of the plan at a public town meeting. Following the meeting all comments will be recorded and, when appropriate, comments will be used to prepare the final report.

The final Map, Plan and Report shall be presented and the residents shall vote on the formation of a sewer district as outlined in the Map, Plan, and Report.

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3 EXISTING FACILITIES

3.1 Map of Existing Facilities

The existing area is served by a series of individual on-site wastewater treatment and disposal system. Most systems are simple septic tanks connected to an absorption bed or seepage pit. In addition to these individual systems there are two main treatment facilities in the area. One serves the Gore Mountain Ski Resort and the second serves a portion of the existing Front Street Development. A map of the existing wastewater facilities (excluding individual wastewater septic systems) is included in Appendix B, Figure B-1.

3.2 History

To date no major wastewater systems have been proposed or constructed to serve the Hamlet area. A history of the existing wastewater systems serving the concentrated growth areas adjacent to the Hamlet area are included in the following section.

3.3 Condition of the Existing Facilities

Gore Mountain

The wastewater treatment systems for Gore Mountain Ski Facility was most recently updated in 1991. The existing plant consists of two treatment processes, a Sequencing Batch Reactor (SBR) system for the summer months, and an oxidation ditch system for the winter months when flows are higher. In addition to the two biological processes the plant has an effluent polishing filter and a sludge holding and digestion tank. The facility discharges under SPDES Permit No. 0034339. The plant has a maximum permit flow of 65,000 GPD. At the time of this report there were no major known violations and the plant is reported to be performing well. A copy of the SPDES Permit and selected plans are included in Appendix B, Attachments B-2 and B-3.

Front Street Development

The wastewater treatment system for Front Street Development was commissioned in 2011. The site is planned to be developed into a mixed residential and recreational area adjacent to the North Creek Ski Bowl. Wastewater treatment is provided by proprietary products by Orenco Wastewater Solutions. The facility has permitted capacity of 12,000 GPD and operates under the SPDES permit No. NY0265870. A copy of the SPDES permit and selected plans are included in Appendix B, Attachments B-4 and B-5.

Individual Wastewater Systems

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Several of the existing residences and businesses located in the Hamlet area are served by individual wastewater systems. These systems are in varying levels of compliance. Several systems are located on lots where standard isolation distances are not possible.

3.4 Financial Status of the Existing Facilities

The existing wastewater system at Gore is financed by ORDA. The Front Street Development wastewater treatment facilities are owned by Mountain Sewer Company. Individual wastewater systems are owned and operated by residential users. Financial data for the two centralized systems are not available.

4 NEED FOR PROJECT

Although the Hamlet area and other locations have been developed without a centralized system, current standards for wastewater design have limited further development in the Hamlet. Small lot sizes and limited soil permeability have precluded several lots from changing or expanding due to limited wastewater treatment capacity. Investment into the community has been limited due to the inability to handle increased wastewater flows.

It is anticipated that a centralized wastewater system will reduce the barriers to development in the community. In addition to reducing barriers for future investment in the community, the establishment of a centralized wastewater system would help residents with sub-standard wastewater systems and reduce the amount of wastewater discharged to the groundwater.

4.1 Health Sanitation and Security

At the time of this report there are no documented issues with health related to existing wastewater systems. However, several facilities discharge wastewater to septic tanks and disposal fields that were designed under previous design standards. Several of these systems do not meet the existing requirements for setback distances, septic tank sizing, and/or application rates. These systems have the potential to discharge untreated wastewater to the environment where health related issues may occur.

4.2 Aging Infrastructure

The individual wastewater systems serving the Hamlet area are of various ages and conditions. As stated previously, the existing parcels do not have sufficient space for conventional wastewater treatment and disposal systems. It is likely that several of the wastewater system will require replacement within the next five to ten years. The effluent from these systems can enter the groundwater and ultimately impact the local water supply or the Hudson River.

4.3 Reasonable Growth

The limitations on new wastewater systems have been noted as a limiting factor to new development in the Hamlet. The development of a centralized wastewater system will help facilitate growth in the area.

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5 SEWER DISTRICT DELINEATION

5.1 Introduction

This report outlines the development of a new sewer district in the Town of Johnsburg for the Hamlet of North Creek. No sewer district has been established for the area previously. The following section details the overall area selected for the sewer district, the segmented sub-areas, and flows for each area.

5.2 Sewer district delineation

The proposed sewer district was delineated based upon guidance from the Wastewater Advisory Committee, local topography, and potential need for wastewater service. A map of the proposed sewer district is presented in Appendix C, Figure C-1. The sewer district includes the Hamlet area, the Ski Bowl, the Town of Johnsburg School, Front Street Development, and commercial/residential areas along Route 28. The sewer district has been segmented into sub-areas based upon anticipated interest in joining a centralized system, local topography, and existing infrastructure. In addition to the areas shown, it is anticipated that there may be a future connection between the sewer district and the Gore Mountain Ski Facility.

5.3 Description of Sub-area

Please see Appendix C, Figure C-2 and Figure C-3 for delineation of the sub-areas. The following section describes sub-areas and lists the projected flow conditions from each sub-area.

5.3.1 Sub-Area 1

This area consists of the parcels along Main Street from Route 28N to Circle Avenue. The area also comprises parcels along Circle Avenue and the parcels along Route 28N from Main Street to the bridge crossing the Hudson River. The area has been developed previously with existing stormwater drainage, drinking water mains, and service lines.

The area is a mix of residential and commercial properties. The major source of wastewater in the area is a laundry facility located along Route 28N. Wastewater for the area can be collected by gravity sewer lines along Route 28N and Circle Avenue which drain to a low point near the intersection of Hudson River and North Creek. Wastewater collected and conveyed to the low point would require pumping to an adjacent sub-area or the final wastewater treatment location.

5.3.2 Sub-Area 2

Sub-Area 2 includes parcels adjacent to Main Street from the intersection of Circle Avenue and Main Street to the intersection of Main Street and Ski Bowl Road. As with Sub-Area 1, this area has been developed previously with existing stormwater drainage, drinking water mains, and

service lines. The area is similar to Sub-Area 1; however, a small hill between the two areas prevents the areas from being connected for wastewater collection.
The area is a mix of residential and commercial properties, with a majority of the properties comprised of larger commercial establishments. Major contributors of flow in this area include the Copperfield Inn, the Tops Market, and various bars and restaurants. A majority of the area can be served by gravity sewer lines leading to a low point on the northern end of Main Street. Wastewater collected in this location can be pumped to an adjacent sub-area, or the final wastewater treatment area.

5.3.3 Sub-Area 3

This area consists of the parcels that comprise the Town Hall, Town of Johnsburg School, and adjacent residential properties between the two locations. Additional residential properties adjacent to the school were not included as part of Sub-Area 3 as these residences likely have sufficient space for conventional septic systems. The area has stormwater and drinking water infrastructure; however, the existing utilities are less of a space constraint than in Sub-Areas 1 and 2.

The major contributor of flow to the area is the school, which is anticipated to be more than 50% of the total flow for the area. This area can be served by a gravity sewer lines collecting wastewater from parcels north and south of the river. A single pump station will likely be required to pump wastewater from Sub-Area 3 to an adjacent sub-area or to the main wastewater treatment location. The North Creek bisects Sub-Area 3; therefore, a river crossing under the existing bridge will be necessary.

5.3.4 Sub-Area 4

Sub-Area 4 consists of the municipal and private parcels adjacent to the Ski Bowl and associated neighboring properties. This sub-area contains the largest land area of any sub-area. Major components of Sub-Area 4 are the Ski Bowl recreation area, the highway facility, and Adirondack Tri-County Nursing and Rehabilitation Center. In addition to the existing facilities, this sub-area comprises the land for Front Street Development. The area contains three water supply well that serve the North Creek Water District.

A majority of the flow for this area comes from the town highway garage and Adirondack Tri-County Nursing and Rehabilitation Center. Flow calculations for this area do not include the anticipated flow from the Front Street development; the flow from this area is included as a concentrated growth area flow. This area does not have an easily identifiable low point; however, the location can likely be served by a gravity collection system and single pump station.

5.3.5 Sub-Area 5

Sub-Area 5 is comprised of the Peacefully Valley Townhouses and the Summit Residences. This area primarily comprises seasonal housing and is segmented from the remainder of the sewer district. Flow from this area is primarily residential and highly variable. This zone can be served by a single pumping station.

5.3.6 Sub-Area 6

This area consists of properties located south of the intersection of Route 28 and Main Street. Major properties in this sub-area are Basil and Wicks Restaurant, gas stations, and the residences of the Gore Village. The area is served by the North Creek Water District via a water main along Route 28 and individual service lines.

The sub-area is separated from all other service areas by a high point located to the north of Sub-Area 6. The area can be served by gravity sewer draining to the south with a pump station to convey wastewater to another sub-area.

6 ALTERNATIVES CONSIDERED

6.1 Design Criteria

Based upon the size of the proposed sewer district flows can be determined for the design of a wastewater treatment system. Due to the lack of information on the existing flow rates multiple methods were used to determine the anticipated hydraulic loadings. For the following section the design flows shall be considered Permit Flows (Maximum flow averaged over a 30-day period).

A previously completed feasibility study had determined that the commercial design flow for the proposed sewer district would be approximately 60,000 gallons per day (GPD). The most recent population data for the Hamlet area indicates a permanent population of approximately 600 within the proposed sewer district. Using flow estimation methods from the Ten State Standards (100 gallons per day per capita) the residential design flow can be calculated to be 60,000 gallons per day. Combining the commercial flow estimate with the residential flow estimate total design flow can be calculated at 120,000 gallons per day.

As a second method of flow estimation the water usage data was inventoried. Water usage is assumed to correlate with the wastewater generation. Daily water records for the North Creek Water District were reviewed and average daily flow values were calculated for 2013, 2014 and 2015. Values for the average daily flow and peak daily flow are included below. The water district does not completely match the extent of the proposed sewer district; however, the majority of water users and wastewater generators are in both. Average water usage was calculated to be about 140,000. This is within the same order of magnitude as the other values. Assuming 20% of water usage is outside of the proposed sewer district, wastewater design flow was determined to be about 110,000.

Table 6-1– Water District Flow Data (GPD)

Year	Average Daily Flow	Max. Daily Flow
2013	134,832	343,500
2014	140,857	290,900
2015	139,837	388,600
Average	**138,500**	**341,000**
Average with 20% Reduction	**110,800**	**272,800**

A final flow estimate was developed based upon an inventory of the properties located within the proposed sewer district and the guidelines in the New York State Design Standards for Intermediate Sized Wastewater Treatment Systems. This flow estimate method was developed to allow for the segmentation of overall flow into sub-areas to allow for planning of what areas to connect. Both residential and commercial properties were inventoried based upon publicly

available data on the Warren County website. Flow was calculated for each sub-area. Results of the analysis indicated a design flow of approximately 119,000 gallons per day. Please note this value was calculated using the maximum daily flows used for sizing of subsurface disposal systems. Although this method used flow values typically reserved for maximum daily flows, this value is within 10% of the flow value determined by the previous commercial and population estimates. Results of the analysis are included in Table 6-2.

Table 6-2– Sub-Area Flow Breakdown

Location	Calculated Flow
Sub-Area 1	27,900
Sub-Area 2	28,900
Sub-Area 3	8,700
Sub-Area 4	9,600
Sub-Area 5	28,500
Sub-Area 6	8,000
Total	**111,600**

Flows rounded to nearest 100 Gallons Per Day

In addition to the sewer district, the flow for the neighboring concentrated growth areas should be considered as consolidation of wastewater treatment systems in the area would be beneficial. Both Gore Mountain Ski Facility and the Front Street Development could be served by the wastewater treatment facility. The combination of the sewer district and the areas of concentrated growth results in a total estimated design flow of 196,000 gallons per day. A summary of the design flows for the sewer district and concentrated growth areas is included below in Table 6-3.

Table 6-3– Sub-Area and Concentrated Flow Area Breakdown

Location	Calculated Flow
Sub-Area 1	27,900
Sub-Area 2	28,900
Sub-Area 3	8,700
Sub-Area 4	9,600
Sub-Area 5	28,500
Sub-Area 6	8,000
Gore Mountain Ski Facility	65,000
Front Street Development	12,000
Total	**188,600**

Flows rounded to nearest 100 Gallons Per Day

For the design of a wastewater treatment system other hydraulic loading characteristics are required. Values for peak daily flow, peak hourly flow and peak instantaneous flow can be determined from multiplying the average flow rate by peaking factors. Peaking factors for these

flow conditions were based upon guidance from the Ten State Standards and previous design experience. Peaking factors are included in Table 6-4 below.

Table 6-4– Wastewater Peaking Factors

Flow Condition	Peaking Factor
Permit Flow	1.0
Peak Day Flow	2.0
Peak Hourly Flow	4.0
Peak Instantaneous Flow	5.0

For the design of a wastewater treatment system typical contaminant characteristics are required. Values for BOD, TSS, Ammonia and Phosphorus loading are included in Table 6-5 below.

Table 6-5 – Typical Wastewater Characteristics

Parameter	Typical Value
Five-Day Biochemical Oxygen Demand (BOD_5)	250 mg/L
Total Suspended Solids (TSS)	250 mg/L
Ammonia (NH_3)	35 mg/L
Total Phosphorus (TP)	10 mg/L

6.2 Location Selection

No centralized wastewater system serves the Hamlet area; therefore, a new location must be selected. The following selection criteria were used to determine the potential location for a wastewater treatment facility. Please note that the locations of the existing wastewater treatment facilities for Gore Mountain Ski Facility and Front Street Development were also evaluated. The following locations were reviewed by the Sewer Committee and the following criteria were used for evaluation.

6.2.1 Proximity to Sewer District

The primary selection criteria was the proximity of the location to the proposed sewer district and areas of concentrated growth. Priority was given to parcels located within or adjacent to the proposed sewer district. Secondary priority was given to locating the wastewater system in relation to the areas of concentrated development. Locating a wastewater treatment system close to these areas will reduce the cost of a wastewater collection system.

6.2.2 Topography

Location selection was also based upon local topography. To reduce the costs of a collection system, the proposed wastewater system should be located in an area where wastewater

generated from the proposed sewer district will drain by gravity. In lieu of draining by gravity the sewer district should be served by a minimal number of pumping stations to convey wastewater to a treatment area. Lower topography areas generally located near the North Creek and Hudson Rivers were given priority as they would be better suited to gravity drainage.

6.2.3 Property Ownership

Parcels currently owned by the Town of Johnsburg or Warren County were given a higher ranking as no land purchase would be required. If a location was found to be suitable, the ability to purchase the land was considered.

6.2.4 Adequate Space

Locations were evaluated to determine if the selected site contained sufficient space for the wastewater systems considered. For planning purposes a size of two acres was used to evaluate if a location had sufficient space for a full buildout of a conventional wastewater system along with all associated equipment. Space was evaluated based upon the presence of flat areas and lack of limits to construction.

6.2.5 Access for construction and maintenance

Parcels with easy access to a major roadway were given priority. Any proposed wastewater treatment system will require significant construction and road access will reduce land development costs. For the location evaluation priority was given to major State and County Routes that can handle large construction vehicles. Locations adjacent to residential developments were discouraged as the construction would negatively impact residents.

6.2.6 Construction Issues

Locations were evaluated to determine if there would be any major barriers to construction. Constructability evaluations were based upon desktop analysis of existing conditions and limited site inspections. Barriers to construction included the presence of shallow bedrock, wetlands, significant natural communities, historic resources, and location relative to floodplains. Priority was given to areas without major construction issues.

6.2.7 Regulatory Issues

Parcels with limited barriers to development due to regulatory controls should be given priority. Regulatory barriers can include permitting required to modify zoning requirements, obtaining approval from State of New York regulatory agencies, and approval of the Adirondack Park Agency.

location, and due to the scenic corridor visual screening will be required as part of the final design.

6.3 Phase I Wastewater Design

Based upon preliminary estimations of sewer fees and local Median Household Income (MHI) data, the cost for a full scale wastewater treatment system is likely not financially viable for the residents of the proposed sewer district. To allow for the establishment of an initial wastewater treatment system a two phase implementation is proposed. Phase I would involve the establishment of a sewer district for a portion of the Hamlet area and a wastewater treatment system sized for the Phase I wastewater flows. Phase II would involve upgrading the facility to handle wastewater from the entire proposed sewer district and the areas of concentrated growth. It is anticipated that this two-step process would allow for a gradual implementation of a full scale wastewater system meeting the future needs of the community.

The following section outlines the options evaluated for the Phase I wastewater design. Based upon input for the Sewer Committee, Phase I will involve the connection of sub-areas 1,2, 4, and the proposed Front Street Development existing flow with a design flow of approximately 80,000 gallons per day. Four treatment options were selected for evaluation and are listed below. Costs associated with collection and pump stations will be determine in the final design cost estimation.

6.4 Phase I Option 1 – Conventional Septic Tank and Absorption Beds

Option 1 would involve the construction of a traditional sub-surface treatment and disposal system. Wastewater would be collected and pumped to one central location where treatment would be provided by a single large septic tank and several absorption beds. Treated wastewater would be discharged to the soil. The following sections outline an analysis of this option.

6.4.1 Process Sizing

Three items would require sizing for this option; the septic tank, pumping station, and absorption area. Sizing for these systems is performed in accordance with the guidance from the New York State Design Standards for Intermediate Sized Wastewater Treatment Systems.

Septic tank size was determined based upon DEC design guidance for the requirement of holding tank volume equal to the daily average flow rate. For Phase I design the septic tank was sized to have a capacity of 80,000 gallons. A wastewater pumping station located adjacent to the septic tank would be sized to hold one-third of the daily flow, or approximately 27,000 gallons. For a pump station of this size, two pumps shall be present for redundancy.

The absorption field for this option would be sized based upon soil conditions and applicable loading rates as stated in the design guidance. The soil conditions at the selected location (and most other alternative locations) are listed as very permeable. Due to the size of the system and

the need for treatment of additional parameters in the wastewater (nitrogen compounds and phosphorus) a lower percolation rate is desired. Assuming soil amendments to achieve a percolation rate of 6-7 minutes per inch the soil can treat 1.0 gallons per square foot per day. For absorption beds the application rate is reduced by 75% to accommodate the limited reaeration capacity, resulting in an application rate of 0.75 gallons per square foot per day. With a wastewater loading of 80,000 gallons per day the required disposal area is 106,000 square feet. This total disposal area would be served by absorption beds 15' in width and 200' in length. Each absorption bed would provide 3,000 square feet of treatment area; with a total of 36 absorption beds required to treat the design flow. A 100% reserve areas would also be required pursuant to regulatory mandates.

6.4.2 Environmental Impacts

The proposed treatment system for option 1 is anticipated to have minimal impact to the environment. The centralized treatment system with a lower application rate will provide enhanced treatment compared to the several existing sub-surface treatment systems. In addition to the enhanced treatment, the proposed system will have more stringent monitoring and maintenance requirements compared to the existing systems. This enhanced monitoring will result in detection of potential contamination issues, whereas the current systems lack monitoring requirements. Due to the size of the proposed system, groundwater monitoring will be required.

This treatment option will also have a minimal increase to impervious area, resulting in negligible stormwater runoff. Electrical demand for this option would be the lowest of all proposed alternatives as pumping from the septic tank would be the only source of demand.

6.4.3 Land Requirements

This option would require the most area of any option evaluated, mostly for the absorption beds. Based upon preliminary sizing using 15' x 200' absorption beds with a 5' spacing between beds the overall area would be this option would require approximately 4.8 acres. This area would require regular mowing to prevent tress from setting roots into the absorption beds; although, the area could be used as a recreation field or open space. As stated previously, a 100% reserve area would also be required.

6.4.4 Construction Problems

This option would require construction activities typical of a conventional sub-surface wastewater disposal system; however, the scope of construction would be much larger than a conventional wastewater system. A cast-in-place concrete tank would likely be most economical for the required size; consequently, the proposed septic tank would require excavation and significant concrete work. The construction of the absorption beds would be relatively simple and could be accomplished with construction equipment typically owned by municipalities. The

large amount of materials required for construction would require substantial material stockpiling and transportation as part of the construction process.

6.4.5 Sustainability Concerns

The modification to the site with this option would be minimal. The use of the existing site would be minimally impacted and allow for continued use of the area. This option would have the lowest electrical demand of any phase I option.

6.4.6 Cost Estimates

A cost estimation for the proposed project is presented in Table 6-6 below. This preliminary cost estimation breaks down the various cost categories by general work. Due to the large areas of absorption beds required, a significant portion of the cost for this option would come from the construction of absorption beds. This cost could be reduced with in-kind town construction and materials provided or procured by the Town of Johnsburg. A 25% contingency has been added for preliminary cost estimations.

The concrete construction would be the most significant cost for the septic tank and pump station component. This estimated amount is based upon cast-in-place construction; as precast construction is typically higher for the sizes involved. Additional components for the septic tank and pump station (pumps, controls, and electrical work) would be relatively minor. A 25% contingency is added for preliminary design.

In addition to the septic tank and pump station, additional site work would be required. Yard piping connecting all the components, soil restoration, plantings, and an access road to allow for periodic pumping out the septic tank would be required.

Professional services anticipated for this project would involve advanced permitting, a hydrogeological study to ensure no contamination of nearby river, typical engineering design, bond counsel, various legal expenses, grant procurement and administration, and construction inspection/documentation. The total anticipated capital cost for this option is $1,576,050.

Operational and maintenance costs for this options were also evaluated to determine the ongoing costs. Operations costs are shown in Table 6-7 below and broken down by general category. Costs were estimated based on operational experience with similar sized municipal projects. Total annual O&M costs are estimated at$32,000.

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Table 6-6– Phase I - Option 1 Capital Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 1 - In-ground System**	
Date:	**3/8/2017**	
A	**Absorption Beds**	
1	Excavation and Storage	$42,000
2	Soil Amendments	$56,000
3	Crushed Stone	$120,520
4	Piping	$67,600
5	Filter Fabric	$40,720
6	Soil Restoration	$62,000
7	**Subtotal**	**$388,840**
8	Contingency (25%)	$97,210
9	**Absorption Beds Total**	**$486,050**
B	**Septic Tank / Pump Station**	
10	Concrete and Excavation	$210,000
11	Pumps	$20,000
12	Controls	$15,000
13	Electrical	$10,000
14	Misc. Components	$10,000
15	**Subtotal**	**$265,000**
16	Contingency (25%)	$66,250
17	**Septic Tank / Pump Station Total**	**$331,250**
C	**Misc. Field Work**	
18	Yard Piping	$75,000
19	Plantings	$50,000
20	Access Road	$10,000
21	**Subtotal**	**$135,000**
22	Contingency (25%)	$33,750
23	**Misc. Field Work Total**	**$168,750**
24	***Construction Grand Total***	***$986,050***
D	**Professional Services**	
25	Permitting	$32,000
26	Hydrogeological Study	$32,000
27	Engineering	$150,000
28	Legal	$64,000
3829	Bond Counsel	$47,000
30	Construction Inspection	$60,000
31	**Professional Services Total**	**$385,000**
32	**Project Contingency (15%)**	**$205,000**
33	***Total Project Cost***	***$1,576,050***

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Table 6-7– Phase I - Option 1 O&M Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 1 - In-ground System**	
Date:	**3/8/2017**	
A		
1	Site Upkeep (Mowing, snow removal, etc.)	$2,500
2	Solids Hauling	$13,000
3	Staffing	$5,000
4	Electric	$2,500
5	Pump Maintenance and Replacement	$2,500
6	Contractual Services	$4,500
7	Water Quality Testing	$2,000
8	**Total**	**$32,000**

6.4.7 Map

A map showing the general layout of Phase I - Option 1 at the selected project location is included in Appendix D, Figure D-2. The map shows the general layout of the septic tank, the absorption system, vegetative screening, and access road. As shown in the map the absorption area will cover a large area and some of the existing structures will be removed. This area will be reserved for infiltration; therefore, no vehicle traffic would be allowed. Recreational used of the area would be permissible if the area is to be grassed. In addition to the proposed map a process schematic of the system is presented in Appendix D, Figure D-3. The process schematic shows the general wastewater flow path and disposal options.

6.4.8 Advantages/Disadvantages

This option would likely have the lowest construction costs, most simplified construction, and lowest operational costs of any options listed. In addition, the construction would have minimal impacts on the site and allow for additional uses of the location. This option would also not require a certified operator, reducing operation costs.

Disadvantages include that this options would be a centralized septic system that would have little flexibility to handle industrial flows or significant changes to flow characteristics. In addition, the Phase 1 wastewater flow is the maximum recommended flow for an underground wastewater disposal system. Based upon the proposed flow, treatment for compliance with groundwater standards would likely be required. Compliance with nitrogen groundwater standards would likely be difficult with a traditional subsoil disposal system.

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6.5 Phase I Option 2 – In-ground Advanced System

This option would involve the construction of a new wastewater treatment and disposal system that would include an advanced treatment system. This option would be similar to Phase I Option 1; however, the system would have a smaller size and would be able to provide some treatment flexibility. At this time ORENCO treatment systems were evaluated and used for process sizing and cost estimations.

6.5.1 Process Sizing

Advanced Treatment Systems typically require vendor basis of design to provide a product warranty. This basis of design can be estimated from design documents, with final process sizing provided by the vendor.

Process sizing is similar to a conventional wastewater septic tank and absorption bed. The overall process consists of a primary settling tank, anoxic mixing basin, fabric media treatment units, recirculation pumping chamber and discharge pumping chamber.

Preliminary design information available from ORENCO provides typical loading rates to the fabric media treatment units in terms of pounds of BOD per day or gallons per day. Based upon preliminary sizing information presented by ORENCO (see appendix _)In addition to the treatment area requirements, a septic tank would be required. This septic tank would be sized as in the Option 1 design. For this design a surface discharge is assumed and no disposal field is required.

6.5.2 Environmental Impacts

The proposed treatment system for option 2 is anticipated to have minimal impact to the environment. The treatment system proposed will increase wastewater treatment and discharge treated effluent to surface waters. The system would be able to provide enhanced treatment compared to the several existing sub-surface treatment systems. In addition to the enhanced treatment, the proposed system will have more stringent monitoring and maintenance requirements compared to the existing systems. This enhanced monitoring will result in detection of potential contamination issues, whereas the current systems lack monitoring requirements. The proposed system can be modified to include treatment of additional parameters including nitrogen and phosphorus.

This treatment option will also have a moderate increase to impervious area, resulting in stormwater runoff that can be treated by surface stormwater features. Electrical demand for this option would be moderate when compared to other Phase I options due to recirculation of the wastewater and pumping from the tanks to the location of discharge.

6.5.3 Land Requirements

This option would require significantly less area than option 1. Based upon preliminary sizing provided by ORENCO with typical surface features the overall area required for this option would be approximately 1.6 acres. This area would require fencing and screening to prevent trespassing on site.

6.5.4 Construction Problems

This option would require site construction typical of an advanced sub-surface wastewater disposal system, although the scope of construction would be much larger. Prefabricated treatment system components would be delivered and installed on-site. The installation of the process tanks would require the use of heavy equipment to lift and place components. Following placement of the process components, construction would be relatively simple and could be accomplished with typical construction equipment.

6.5.5 Sustainability Concerns

The modification to the site with this option would be moderate. Additional proprietary treatment units would be added to the proposed site. These units require addition recirculation to meet treatment goals, therefore additional electrical use would be required. As a result of construction, stormwater control features would be required. Although this option would use more electricity and generate more stormwater runoff than Option 1, the treatment flexibility with this setup is anticipated to result in better treatment of effluent parameters.

6.5.6 Cost Estimates

A cost estimation for the proposed project is presented in Table 6-8 below. This preliminary cost estimation breaks down the various cost categories by general work. The advanced treatment units provided by ORENCO would be the largest cost item for the project; however, this item is comparable to the absorption fields presented in Option 1.

The concrete construction would be the most significant cost for the septic tank and pump station component. This estimated amount is based upon cast-in-place construction, as precast construction is typically higher for the sizes involved. Additional components for the septic tank and pump station (Pumps, Controls, and electrical work) would be relatively minor. A 25% contingency is added for preliminary design.

In addition to the septic tank and pump station, additional site work would be required. Yard piping connecting all the components, soil restoration, plantings, and an access road for pumping out the septic tank would be required. In addition to these items a new control building would be required to house controls, aeration equipment and other components.

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Professional services anticipated for this project would involve advanced permitting, typical engineering design, ORENCO Engineering costs, bond counsel, various legal expenses, grant procurement and administration, and construction inspection/documentation. The total anticipated cost for this option is $1,976,250.

Operational and maintenance costs for this options were also evaluated to determine the ongoing costs. Operations costs are shown in Table 6-9 below and broken down by general category. Costs were estimated based on operational experience with similar sized municipal projects. Total annual O&M costs are estimated at $52,000.

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Table 6-8– Phase I - Option 2 Capital Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 2 - Advanced System**	
Date:	**3/8/2017**	
A	**Treatment System**	
1	ORENCO Treatment Units	$760,000
2	**Subtotal**	**$760,000**
3	Contingency (5%)	$38,000
4	**Treatment System Total**	**$798,000**
B	**Septic Tank / Pump Station**	
5	Concrete and Excavation	$210,000
6	Pumps	$20,000
7	Controls	$15,000
8	Electrical	$10,000
9	Misc. Components	$10,000
10	**Subtotal**	**$265,000**
11	Contingency (25%)	$66,250
12	**Septic Tank / Pump Station Total**	**$331,250**
C	**Misc. Field Work**	
13	Yard Piping	$50,000
14	Plantings	$50,000
15	Access Road	$10,000
16	Control Building	$86,000
17	**Subtotal**	**$196,000**
18	Contingency (25%)	$49,000
19	**Misc Field Work Total**	**$245,000**
20	***Construction Grand Total***	***$1,374,250***
F	**Professional Services**	
21	Permitting	$54,000
22	Engineering	$150,000
23	Legal	$54,000
24	Bond Counsel	$20,000
25	Construction Inspection	$67,000
26	**Professional Services Total**	**$345,000**
27	**Project Contingency (15%)**	**$257,000**
28	***Total Project Cost***	***$1,976,250***

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Table 6-9– Phase I - Option 2 O&M Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 2 - Advanced System**	
Date:	**3/8/2017**	
A		
1	Site Upkeep (Mowing, snow removal, etc.)	$5,000
2	Solids Hauling	$15,000
3	Staffing	$10,000
4	Electric	$7,500
5	Equip Maintenance and Replacement	$4,000
6	Contractual Services	$6,000
7	Water Quality Testing	$5,000
8	**Total**	**$52,000**

6.5.7 Map

A map showing the general layout of Phase I - Option 2 at the selected project location is included in Appendix D, Figure D-4. The map shows the general layout of the septic tank, the Orenco System units, control building, fencing, vegetative screening, and access road. As shown in the map the treatment area will cover a large area but will not impact the existing material storage area for the associated highway garage. Compared to Option 1, additional roadway facilities and vegetative screening will be required to provide maintenance and visually hide the site. Recreational used of the area would not be permissible as the units would require protection from damage. In addition to the proposed map a process schematic of the system is presented in Appendix D, Figure D-5. The process schematic shows the general wastewater flow path and disposal options.

6.5.8 Advantages/Disadvantages

This option would likely have construction costs that are higher yet comparable to Option 1. Due to additional site features and the proposed treatment system, the visual impact from this option would be increased compared to Option 1. The resulting construction would require the area dedicated for treatment to be isolated from the remainder of the Scenic Byway, likely by vegetated features. This option would also require a certified operator, increasing operational costs.

Advantages of this system include a more robust centralized treatment system that would have flexibility to handle changes in wastewater flow concentration without the need for a traditional wastewater system.

6.6 Phase I Option 3 – Conventional SBR System

This option would involve the construction of a traditional sequencing batch reactor (SBR) system. The SBR is a modified activated sludge process for wastewater treatment. In this system, wastewater is added to a tank, mixed with bacteria by aeration, allowed to settle by gravity, and decanted to final disinfection and discharge. The advantage of an SBR process is that equalization, aeration, and clarification can all be achieved in a single tank. Although a single tank is required for treatment, at least two SBR units are required. SBR system are well suited to low flow conditions and can provide nutrient removal (phosphorus and nitrogen) in addition to BOD treatment.

6.6.1 Process Sizing

The SBR process requires sizing of the headworks screening and grit removal equipment along with determining the required SBR tank volume based upon hydraulic loading and organic loading.

Screening should be sized to treat the peak hourly flow. Based on the permit flow of 80,000 gallons per day a peaking factor of 4.0 would be used. The resulting peak hourly flow would be 240,000 gallons per day. Screening equipment does not take up a large area, therefore the flow to be treated will not have a major impact on the building size, but will impact the proposed cost.

The Biological SBR system would not have flow equalization; therefore, it should be sized to treat the peak daily flow. The peak daily factor is 2.0 therefore the peak daily flow would be 120,000 gallons per day. The incoming wastewater characteristics used for system design are outlined in Table 6-5. Preliminary sizing calculations were used to determine that two tanks with a size of 30' by 30' with a depth of 12' would be required. The tanks would be served by an aeration system providing approximately 60 cubic feet per minute of aeration to meet biological oxygen requirements.

6.6.2 Environmental Impacts

SBR's are a standard method for treating wastewater, and the operational parameters are well understood. This option would allow for a large amount of flexibility in wastewater treatment and allow for treatment of additional components such as nitrogen and phosphorus compounds with modifications to the aeration and un-aerated mixing cycles. Discharge would likely be to a surface water, therefore a review of the discharge location and the impact to the receiving stream would be required.

The SBR process would require containment over the tank to prevent the spread of odors, provide visual screening, and minimize noise from operations. A simple building could be constructed over the SBR tank. This building would also provide an insulated area protected from the elements during winter operations.

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6.6.3 Land Requirements

This option would require buildings for the screening, SBR treatment process and any sludge holding or treatment. This would also require some site modifications to allow for access by trucks and maintenance equipment. A total site area of approximately 1.3 acres is anticipated for this option.

6.6.4 Construction Problems

This option would involve traditional building and concrete construction. Although the tanks would be a large construction item, it is not likely that there would be major construction issues using contractors in the area. The proposed site would likely have a high groundwater table resulting in significant sheeting and dewatering during construction. The construction activities may require an extensive period to complete; depending upon the seasonal tourism activities, the construction may be visible from the roadway.

6.6.5 Sustainability Concerns

SBR treatment would require the construction of new impervious surfaces that would require the construction of stormwater treatment measure. SBR treatment would require the use of aeration blowers to provide oxygen to the process. These aeration blowers would require some electrical usage. The system would provide high quality effluent that could be discharged to a surface water.

6.6.6 Cost Estimates

A cost estimation for the proposed project is presented in Table 6-10 below. This preliminary cost estimation breaks down the various cost categories by general work. General categories for work include the headworks, SBR system, site work, and additional typical construction components (Sludge Handling, Electrical, SCADA, and HVAC).

The proposed headworks building would require components to provide preliminary treatment of wastewater to prevent clogging of downstream components. Costs for the headworks building would be primarily equipment for screening, new concrete work and the construction of a building to house the equipment. Some of these costs could be covered with in-kind services or materials to reduce costs.

Costs associated with the SBR process would be greater than 50% of the proposed construction costs. Costs associated with the SBR process would be the construction of new concrete foundation and tanks, building construction, process equipment, pumps, blowers and other miscellaneous components. These costs would likely require contracting out construction activities.

Additional site construction would be required for construction access and maintenance, provide screening from adjacent properties, addition of stormwater control, and additional site improvements.

Professional services anticipated for this project would involve typical permitting, advanced engineering design, bond counsel, various legal expenses, grant procurement and administration, and construction inspection/documentation. The total anticipated cost for this option is $3,093,000.

Operational and maintenance costs for this options were also evaluated to determine the ongoing costs. Operations costs are shown in Table 6-11 below and broken down by general category. Costs were estimated based on operational experience with similar sized municipal projects, and other similar sized municipal systems in the region. Total annual O&M costs are estimated at $116,500.

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Table 6-10– Phase I - Option 3 Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 3 - Conventional SBR**	
Date:	**3/8/2017**	
A	**Headworks**	
1	Equipment	$27,500
2	Concrete	$27,500
3	Building	$40,000
4	**Subtotal**	**$95,000**
5	Contingency (25%)	$24,000
6	**Headworks Total**	**$119,000**
B	**SBR Treatment System**	
7	Concrete and Excavation	$320,000
8	Piping/Diffusers	$95,000
9	Equipment	$260,000
10	Building	$360,000
11	Blowers	$70,000
12	**Subtotal**	**$1,105,000**
13	Contingency (30%)	$276,000
14	**SBR Treatment System Total**	**$1,381,000**
C	**Misc. Field Work**	
15	Yard Piping	$40,000
16	Plantings	$40,000
17	Access Roads and Paving	$35,000
18	**Subtotal**	**$115,000**
19	Contingency (30%)	$30,000
20	**Misc Field Work Total**	**$145,000**
21	**Sludge Storage and Equip. Total**	**$100,000**
22	**Electrical Total**	**$125,000**
23	**SCADA Controls Total**	**$100,000**
24	**HVAC Total**	**$50,000**
25	***Construction Grand Total***	***$2,135,000***
D	**Professional Services**	
26	Permitting	$50,000
27	Engineering	$255,000
28	Legal	$90,000
29	Bond Counsel	$40,000
30	Construction Inspection	$120,000
31	**Professional Services Total**	**$555,000**
32	**Project Contingency (15%)**	**$403,000**
33	***Total Project Cost***	***$3,093,000***

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Table 6-11– Phase I - Option 3 O&M Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 3 - Conventional SBR**	
Date:	**3/8/2017**	
A		
1	Site Upkeep (Mowing, snow removal, etc.)	$5,000
2	Headworks Electric	$3,000
3	Headworks Maintenance	$1,500
4	SBR Electric	$10,000
5	SBR Maintenance	$3,500
6	SBR Chemicals	$5,000
7	Laboratory Electric	$250
8	Laboratory Heat	$1,250
9	Laboratory Equipment	$1,500
10	Telecom	$1,000
11	Sludge Hauling	$12,000
12	Sludge Electric	$1,500
13	Contractual Services	$6,000
14	Water Quality Testing	$5,000
15	Staff	$60,000
16	**Total**	**$116,500**

6.6.7 Map

A map showing the general layout of Phase I - Option 3 at the selected project location is included in Appendix D, Figure D-6. The map shows the general layout of the headworks facilities, the SBR building, vegetative screening, stormwater control, and access road. As shown in the map the treatment area will be relatively compact. The area will be screened from nearby areas to reduce the visual impact of the facility. In addition to the proposed map a process schematic of the system is presented in Appendix D, Figure D-7. The process schematic shows the general wastewater flow path and disposal options.

6.6.8 Advantages/Disadvantages

The advantages this option would include the use of a conventional wastewater treatment process to handle the flow from the proposed sewer district. In addition, the proposed process could be constructed to integrate with a future expansion, reducing the loss of infrastructure between the planned Phase I and Phase II. The SBR process also would be better able to deal with the variable flow rates and wastewater concentrations that would be generated by the sewer district than option 1 or option 2.

This option would require a significant investment in infrastructure, with new screening and grinding facilities, concrete tanks, building for treatment area, laboratory, sludge holding and disposal facilities, and a full-time certified operator to maintain the facility. These investments would require additional maintenance over the long-term to ensure compliance with wastewater regulations.

6.7 Phase I Option 4 – Force Main to Gore Mountain

This option would involve the agreement of Gore Mountain Ski Facility to convey wastewater from the proposed sewer district to the Gore Mountain Wastewater Treatment Facility (GMWWTF). This option would involve the construction of a series to pump stations to convey wastewater along the existing access road to the facility and upgrading the facility at Gore to treat the increased wastewater flow.

6.7.1 Process Sizing

The process sizing for this option would be relatively minor, with sizing of pump stations and force main lines required. Based upon preliminary evaluations three pump stations would be required to meet the pressure and flow requirements.

In addition to the sizing of the force main, additional improvements to the Gore Mountain Wastewater Treatment Facility would be required. Due to the many upgrade options to meet treatment requirements with increased flow a specific treatment process cannot be identified at this time; however, based upon organic and hydraulic loading cost estimations can be made to estimate flow.

6.7.2 Environmental Impacts

This option would likely involve construction of a force main along an existing disturbed area or roadway to minimize construction impacts. Due to the construction issues caused by shallow depth to bedrock in the area, appropriate access to the construction site would be required. Construction along the Gore access road would be the most suitable location as the access road provides easy access for construction vehicles. If construction occurs along the existing access road the disturbances caused by construction would be minor. Required blasting would occur within the existing right-of-way for the access road, minimizing impacts to environmentally sensitive areas.

Should construction be located outside of the existing access road, significant disturbances to the existing natural areas would be required to provide access for construction vehicles. Blasting through bedrock would be required in areas along the existing ski trails and in forested areas. These activities would significantly impact the surrounding environmental areas.

In addition to the environmental impacts caused by the force main construction, the existing wastewater facility would likely be expanded to discharge increased amounts of treated

wastewater. The existing plant discharges wastewater to an adjacent intermittent stream with strict effluent limitations. Increased flow of wastewater to the intermittent stream may result in impacts to the stream. Additional treatment may be required to meet new effluent discharge requirements.

6.7.3 Land Requirements

This option would have the lowest land requirements of any of the options listed. The new force main would be located within an existing R.O.W. to allow for long-term maintenance. New pumps stations would be required with this option; however, they could be located to minimize land investments.

6.7.4 Construction Problems

This option would involve the construction a new force main along an access road that would require significant construction. Potential construction issues include excavation located in bedrock/ledge and locating the proposed trench to minimize impacts to environmentally sensitive areas. The force main would have to be protected from freezing, and require deep burial of any pipe. In addition to the methods of construction, the construction phasing should be planned in a way to prevent impacts to the seasonal tourism.

6.7.5 Sustainability Concerns

This option would require significant energy consumption due to pumping the wastewater to an elevated location. Additionally, the construction of a pressurized force main would result in a high pressure line that has potential for breakage from shock loadings. Although this option would have the smallest land use of any option, the maintenance and energy requirements would be the greatest from any Phase I Option.

6.7.6 Cost Estimates

A cost estimation for the proposed option is presented in Table 6-12 below. This preliminary cost estimation breaks down the various costs by general categories including the booster stations, force mains, and upgrades to the Gore Mountain Wastewater Treatment Facility.

Three booster stations would be required to convey wastewater from the selected location for treatment to the Gore Mountain Facility. These booster stations would require buildings to house and protect the required pumps, piping and additional force main components. Due to the need for continuous pumping each booster station would have a backup generation for emergency operations.

The majority of the construction costs associated with this option would come from the installation of new pipeline along the existing access road. Due to the variable conditions and

advanced construction techniques required, the installation costs for new ledge and non-ledge force main will higher than typical construction.

In addition to the proposed booster stations and force main, upgrades to the Gore Mountain Wastewater Treatment Facility will be required with this option. The existing facility had a maximum permitted flow of 65,000. Assuming additional flow of 80,000 GPD from Phase I, the wastewater facility will require upgrades to the existing process components. A preliminary evaluation of the existing facility indicates that upgrades to the headworks facility, the biological system, and the tertiary filtration would be required per DEC requirements.

Professional services anticipated for this project would involve advanced permitting, advanced engineering design, bond counsel, various legal expenses, grant procurement and administration, and construction inspection/documentation. The total anticipated capital cost for this option is $5,225,000. Please note this treatment option would include treatment of Phase I flows and the existing permitted flow at Gore Mountain.

Operational and maintenance costs for this options were also evaluated to determine the ongoing costs. Operations costs are shown in Table 6-13 below and broken down by general category. Costs were estimated based on operational experience with similar sized municipal projects, and other similar sized municipal systems in the region. Total annual O&M costs are estimated at $167,500. Please note this O&M cost would include treatment of Phase I flows and the existing permitted flow at Gore Mountain.

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Table 6-12– Phase I - Option 4 Capital Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 4 - Force Main to Gore**	
Date:	**3/8/2017**	
A	**Booster Stations**	
1	Pumps and Installation	$60,000
2	Generator and Electric Work	$60,000
3	Piping and Valves	$40,000
4	Building and Site Work	$90,000
6	**Subtotal**	**$250,000**
7	Contingency (30%)	$60,000
8	**Booster Stations Total**	**$310,000**
B	**Force Main**	
9	Non-Ledge Force Main	$500,000
10	Ledge Force Main	$350,000
11	**Subtotal**	**$850,000**
12	Contingency (10%)	$85,000
13	**Force Main Total**	**$935,000**
C	**Gore WWTP Upgrade**	
14	Upgrade to Headworks	$375,000
15	Upgrade to Biological Treatment	$1,200,000
16	Upgrade to Tertiary Treatment	$385,000
17	**Subtotal**	**$1,960,000**
18	Contingency (10%)	$196,000
19	**Gore WWTP Upgrade Total**	**$2,156,000**
20	**Controls**	**$125,000**
21	***Construction Grand Total***	***$3,330,000***
D	**Professional Services**	
22	Permitting	$200,000
23	Engineering	$500,000
24	Legal	$140,000
25	Bond Counsel	$180,000
26	Construction Inspection	$220,000
27	**Professional Services Total**	**$1,240,000**
28	**Project Contingency (15%)**	**$685,000**
29	***Total Project Cost***	***$5,225,000***

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Table 6-13– Phase I - Option 4 O&M Cost Estimation

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Option 4 – Force Main to Gore**	
Date:	**3/8/2017**	
A		
1	Headworks Electric	$4,000
2	Headworks Maintenance	$2,000
3	Biological Treatment Electric	$15,000
4	Biological Treatment Maintenance	$5,000
5	Biological Treatment Chemicals	$7,000
6	Laboratory Electric	$500
7	Laboratory Heat	$2,500
8	Laboratory Equipment	$2,000
9	Telecom	$1,000
10	Sludge Hauling	$15,000
11	Sludge Electric	$2,500
12	Tertiary Filters	$3,000
13	Reaeration System	$5,000
14	Contractual Services	$8,000
15	Water Quality Testing	$5,000
16	Staff	$90,000
17	**Total**	**$167,500**

6.7.7 Map

A map showing the general layout of Phase I - Option 4 at the selected project location is included in Appendix D, Figure D-8. The map shows the general layout of the proposed force main along the existing access road and pump stations at approximate locations along the proposed path. Although new pump stations are proposed, no additional screenings or facilities are shown. In addition to the proposed map a process schematic of the system is presented in Appendix D, Figure D-9. The process schematic shows the general wastewater flow path and connection to the Gore Mountain Wastewater Treatment Facility. The process components of the Gore Mountain facility are not shown as the exact modifications cannot be determined at this time.

6.7.8 Advantages/Disadvantages

This option would have the advantage of utilizing an existing wastewater treatment system, which may increase the potential for obtaining grant funding. In addition, the existing facility has operational staff with a history of successful wastewater plant operations.

APA review would be minimal with this option as visual impacts would be reduced, additional screening and mitigation of visual impacts.

Table 7-4– Non-Monetary Analysis – Phase II

	Phase II Options		
	Option 1 – Full Conventional SBR	**Option 2 - Full Conventional MBR**	**Option 3 – Full Advanced System**
Ease of Operation & Operator Training	2	2	2
Treatment Performance	3	3	1
Mechanical Reliability	3	3	2
Ease of Construction	1	2	2
Future Treatment Standards	2	3	1
Permitting Process	2	2	1
Total	**13**	**15**	**9**

7.6 Selected Alternative Phase – II

Based upon monetary and non-monetary factors **Option 1 – Full Conventional SBR is** recommended for Phase II.

8 RECCOMENDED ALTERNATIVE

8.1 Project Design – Phase I

For Phase I the proposed collection system would include a new gravity collection system and connections to residential units. In addition to the gravity system the proposed collection system would contain pump stations to connect hydraulically disconnected areas and a main pump station to transport wastewater to the selected location.

8.1.1 Collection System Layout

The proposed collection system would consist of 8" sewer mains, and residential connections. For each sub-area the extent of the collection system and number of residential connections were determined based upon drawings C-2 and C-3.

For Sub-Area 1 the gravity collection system would consist of approximately 2,300 linear feet of sewer main located under Main Street, Bridge Street, and Circle Ave. In addition to this gravity sewer main there would be approximately sixty (60) lateral connections. The gravity collection system would ultimately discharge to a pump station located at the topographical low point of the system located adjacent to the Hudson River. This pump station would be the main pump station that would lead to the disposal field.

Fo Sub-Area 2 the gravity collection system would consist of approximately 1,200 linear feet of sewer main located under Main Street. In addition to the gravity collection system there would be approximately forty (40) lateral connections. The system would ultimately discharge to a pump station located at the topographical low point and be pumped into the collection system for Sub-Area 1.

For sub-area 4 the gravity collection system would consist of approximately 500 linear feet of gravity collection systems with less than ten (10) lateral connections. The system would discharge to a pump station that would discharge to the pump station for Zone 2.

8.1.2 Pumping Stations

The previous section describes the proposed collection system. This section describes the pump station used to deliver wastewater to the selected location. The proposed pump station would be located in Zone 1 and be sized to pump the wastewater from the entire Phase I flow. The proposed force main would be located under Bridge Street, connect with NY Route 28 and ultimately to Peaceful Valley Road. The force main would be approximately 5,000 ft in length.

8.1.3 Treatment

Treatment for this option would be in the selected alternative for Phase I.

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8.2 Total Project Cost Estimate – Phase I

Table 8-1– Project Budget – Phase I

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Selected Alternative**	
Date:	**3/8/2017**	
A	**Treatment System**	
1	ORENCO Treatment Units	$760,000
2	**Subtotal**	**$760,000**
3	Contingency (5%)	$38,000
4	**Treatment System Total**	**$798,000**
B	**Septic Tank / Pump Station**	
5	Concrete and Excavation	$210,000
6	Pumps	$20,000
7	Controls	$15,000
8	Electrical	$10,000
9	Misc. Components	$10,000
10	**Subtotal**	**$265,000**
11	Contingency (25%)	$66,250
12	**Septic Tank / Pump Station Total**	**$331,250**
C	**Misc. Field Work**	
13	Yard Piping	$50,000
14	Plantings	$50,000
15	Access Road	$10,000
16	Control Building	$86,000
17	**Subtotal**	**$196,000**
18	Contingency (25%)	$49,000
19	**Misc Field Work Total**	**$245,000**
20	***Treatment Construction Grand Total***	***$1,374,250***
D	**Sub-Area 1 Collection System**	
21	8" Gravity Force Main	$250,000
22	Lateral Connections	$150,000
23	Pump Station	$100,000
24	**Subtotal**	**$500,000**
25	Contingency (15%)	$75,000
26	**Sub-Area 1 Collection Total**	**$575,000**
E	**Sub-Area 2 Collection System**	
27	8" Gravity Force Main	$150,000
28	Lateral Connections	$100,000
29	Pump Station	$50,000
30	**Subtotal**	**$300,000**

31	Contingency (15%)	$45,000
32	**Sub-Area 2 Collection Total**	**$345,000**
F	**Sub-Area 4 Collection System**	
33	8" Gravity Force Main	$50,000
34	Lateral Connections	$25,000
35	Pump Station	$50,000
36	**Subtotal**	**$125,000**
37	Contingency (15%)	$20,000
38	**Sub-Area 4 Collection Total**	**$145,000**
39	**Force Main to Selected Site**	**$500,000**
40	**Site Land Purchase**	**$150,000**
41	***Collection System Construction Grand Total***	***$1,715,000***
G	**Professional Services**	
42	Permitting	$120,000
43	Engineering	$300,000
44	Legal	$80,000
45	Bond Counsel	$30,000
46	Construction Inspection	$120,000
47	**Professional Services Total**	**$650,000**
48	**Project Contingency (10%)**	**$373,000**
49	***Total Project Cost***	***$4,112,250***

8.3 Annual Operations Budget -Phase I

Table 8-2 – Annual O&M Budget – Phase I

Project:	**North Creek Map Plan and Report**	
Description:	**Phase I Operational Budget**	
Date:	**3/8/2017**	
A		
1	Site Upkeep (Mowing, snow removal, etc.)	$5,000
2	Solids Hauling	$15,000
3	Staffing	$10,000
4	Electric	$7,500
5	Equip Maintenance and Replacement	$4,000
6	Contractual Services	$6,000
7	Water Quality Testing	$5,000
8	Sub-Area 1 Electricity and Maintenance	$5,000
9	Sub-Area 2 Electricity and Maintenance	$5,000
10	Sub-Area 4 Electricity and Maintenance	$5,000
11	**Total**	**$67,000**

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8.4 Calculated User Fees

Based upon the proposed selected alternative the following user fees were calculated. Fees were based on a 30 year payback period at 3% interest. Annual users fees are presented as a function of grant funds received. For Phase II it is anticipated that there will be 267 Equivalent Dwelling Units (EDU's) with an average EDU flow of 300 gallons per unit.

Table 8-3 – Estimated Annual User Fees – Phase I

Grant Funding	Construction Debt	Annual O&M Fees	Total Sewer Costs	Total User Fees
0%	$209,724	$67,000	$276,724	$1,064
10%	$188,751	$67,000	$255,751	$983
20%	$167,778	$67,000	$234,778	$902
30%	$146,805	$67,000	$213,805	$821
40%	$125,832	$67,000	$192,832	$740
50%	$104,859	$67,000	$171,859	$659
60%	$83,886	$67,000	$150,886	$578
70%	$62,913	$67,000	$129,913	$497
80%	$41,940	$67,000	$108,940	$416
90%	$20,967	$67,000	$87,967	$355
100%	$0	$67,000	$67,000	$257

8.5 Project Design – Phase II

For Phase II the proposed collection system would include new gravity collection systems for the Sub-Areas not connected with the system created in Phase I. New lateral connections would be included to connect buildings to the proposed gravity collection system. In addition to the gravity system the proposed collection system, pump stations would be included to connect hydraulically disconnected areas and a main pump station to transport wastewater to the selected location.

8.5.1 Collection System Layout

For Sub-Area 3 the gravity collection system would consist of approximately 750 linear feet of sewer main located under Main Street, adjacent to the existing school. In addition to this gravity sewer main there would be less than ten (10) lateral connections for the proposed service area. The gravity collection system would ultimately discharge to a pump station located at the topographical low point of the system located adjacent to the North Creek. This pump station would connect with Sub-Area 1 via a new force main located under the bridge. Connections located on the northern side of the bridge may connect to Zone 1 with gravity connections or may require small pump stations to connect to the existing system.

For Sub-Area 5 the gravity collection system would consist of approximately 1,500 linear feet of sewer main located adjacent to NYS Route 28. The two main connections for this system are

both larger residential developments with existing systems. Information on the existing wastewater disposal systems for these locations was not available for this Map, Plan, and Report; however, for planning purposes it was estimated that the locations can discharge to the sewer main with existing equipment. This discharge would be directed to a pump station located at the topographical low point of the system. As opposed to other Sub-Areas, this pump station would be located adjacent to the force main to the selected location and would likely pump into the force main.

For Sub-Area 6 the gravity collection system would consist of approximately 1,300 linear feet of gravity collection systems with less than ten (10) lateral connections. The system would discharge to a pump station that would discharge gravity collection system for Sub-Area 5.

8.5.2 Pumping Stations

The previous section describes the proposed collection system. This section describes the pump station used to deliver wastewater to the selected location for Phase II. The proposed pump station would be located in Zone 5 and be sized to pump the wastewater from Sub-Areas 5 and 6. Flow from Sub-Area 3 would be sent to the pump station installed as part of Phase I. The proposed pump station for Sub-Areas 5 and 6 would connect into the force main proposed during Phase I.

8.5.3 Treatment

Treatment for this option would be in the selected alternative for Phase II.

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8.6 Total Project Cost Estimate – Phase II

Table 8-4 – Project Cost Estimate – Phase II

Project:	**North Creek Map Plan and Report**	
Description:	**Phase II Option 1 - Conventional SBR**	
Date:	**3/8/2017**	
A	**Headworks**	
1	Equipment	$55,000
2	Concrete	$35,000
3	Building	$60,000
6	**Subtotal**	**$150,000**
7	Contingency (30%)	$45,000
8	**Headworks Total**	**$195,000**
B	**SBR Treatment System**	
9	Concrete and Excavation	$731,500
10	Piping/Diffusers	$190,000
11	Equipment	$550,000
12	Building	$1,100,000
13	Blowers	$145,000
14	**Subtotal**	**$2,716,500**
15	Contingency (10%)	$272,000
16	**SBR Treatment System Total**	**$2,988,500**
C	**Misc. Field Work**	
17	Yard Piping	$60,000
18	Plantings	$40,000
19	Access Road	$25,000
20	**Subtotal**	**$125,000**
21	Contingency (30%)	$37,500
22	**Misc. Field Work Total**	**$162,500**
23	**Sludge Storage and Equip. Total**	**$200,000**
24	**Electrical Total**	**$200,000**
25	**SCADA Controls Total**	**$200,000**
26	**HVAC Total**	**$75,000**
27	***Construction Grand Total***	***$3,821,500***
E	**Sub-Area 3 Collection System**	
27	8" Gravity Force Main	$75,000
28	Lateral Connections	$25,000
29	Pump Station	$50,000
30	**Subtotal**	**$150,000**
31	Contingency (15%)	$23,000
32	**Sub-Area 3 Collection Total**	**$173,000**
F	**Sub-Area 5 Collection System**	

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33	8" Gravity Force Main	$150,000
34	Lateral Connections	$50,000
35	Pump Station	$100,000
36	**Subtotal**	**$300,000**
37	Contingency (15%)	$45,000
38	**Sub-Area 3 Collection Total**	**$345,000**
F	**Sub-Area 6 Collection System**	
33	8" Gravity Force Main	$130,000
34	Lateral Connections	$25,000
35	Pump Station	$50,000
36	**Subtotal**	**$205,000**
37	Contingency (15%)	$31,000
38	**Sub-Area 3 Collection Total**	**$236,000**
41	***Collection System Construction Grand Total***	***$750,000***
G	**Professional Services**	
42	Permitting	$100,000
43	Engineering	$400,000
44	Legal	$60,000
45	Bond Counsel	$40,000
46	Construction Inspection	$180,000
47	**Professional Services Total**	**$780,000**
48	**Project Contingency (10%)**	**$540,000**
49	***Total Project Cost***	***$5,891,500***

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8.7 Annual Operations Budget -Phase II

Table 8-5 – O&M Cost Estimate – Phase II

Project:	**North Creek Map Plan and Report**	
Description:	**Phase II Option 1 - Conventional SBR**	
Date:	**3/8/2017**	
A		
1	Headworks Electric	$7,500
2	Headworks Maintenance	$4,000
3	SBR Treatment Electric	$25,000
4	SBR Treatment Maintenance	$10,000
5	SBR Treatment Chemicals	$12,000
6	Laboratory Electric	$1,250
7	Laboratory Heat	$2,500
8	Laboratory Equipment	$2,000
9	Telecom	$1,000
10	Sludge Hauling	$30,000
11	Contractual Services	$8,000
12	Water Quality Testing	$5,000
13	Staff	$90,000
14	Site Upkeep (Mowing, snow removal, etc.)	$5,000
15	Sub-Area 1 Electricity and Maintenance	$5,000
16	Sub-Area 2 Electricity and Maintenance	$5,000
17	Sub-Area 3 Electricity and Maintenance	$5,000
18	Sub-Area 4 Electricity and Maintenance	$5,000
19	Sub-Area 5 Electricity and Maintenance	$5,000
20	Sub-Area 6 Electricity and Maintenance	$5,000
14	**Total**	**$233,250**

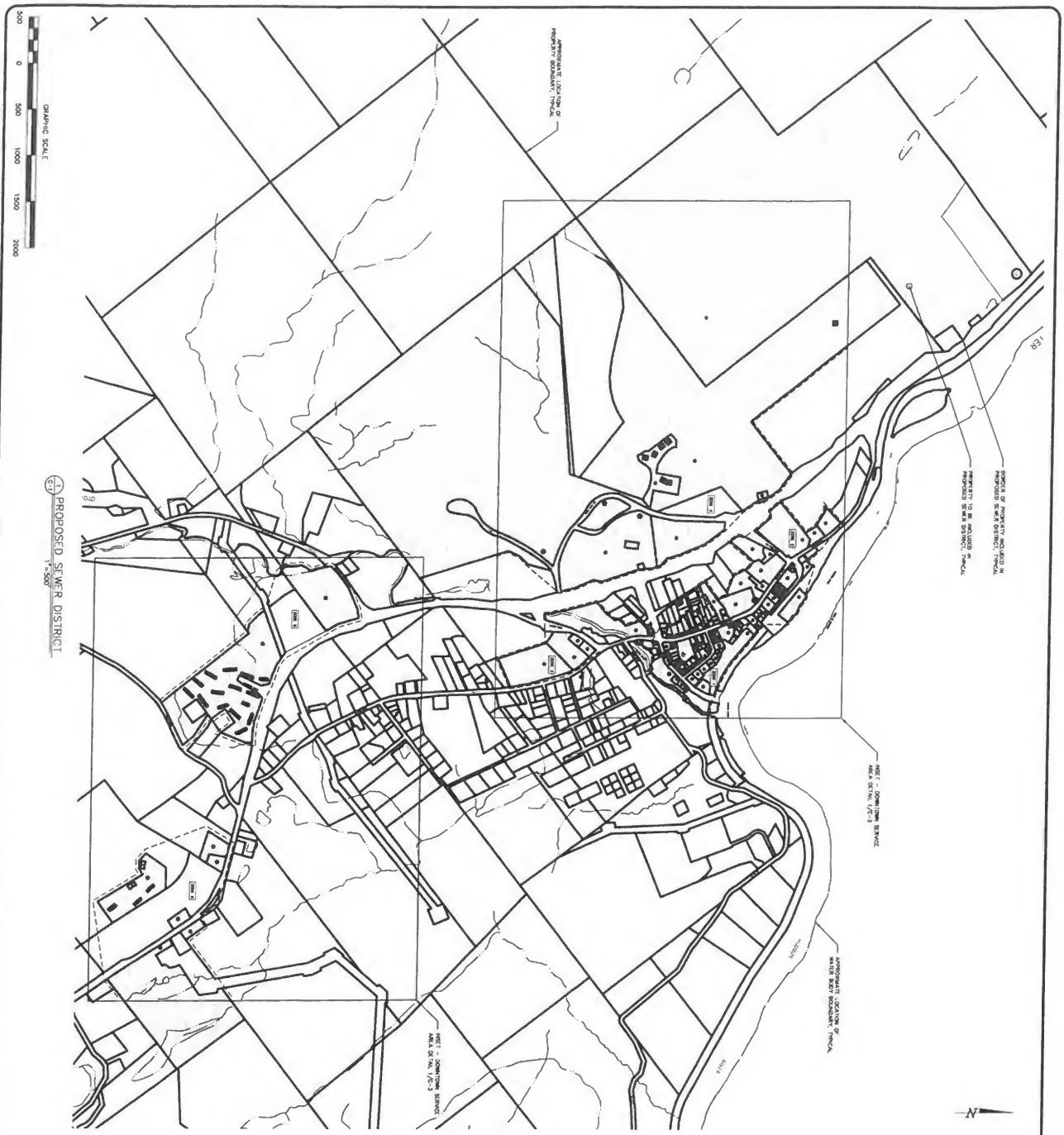
8.8 Calculated User Fees

Based upon the proposed selected alternative the following user fees were calculated. Fees were based on a 30-year payback period at 3% interest. Annual user's fees are presented as a function of grant funds received. For Phase II it is anticipated that there will be 667 Equivalent Dwelling Units (EDU's) with an average EDU flow of 300 gallons per unit.

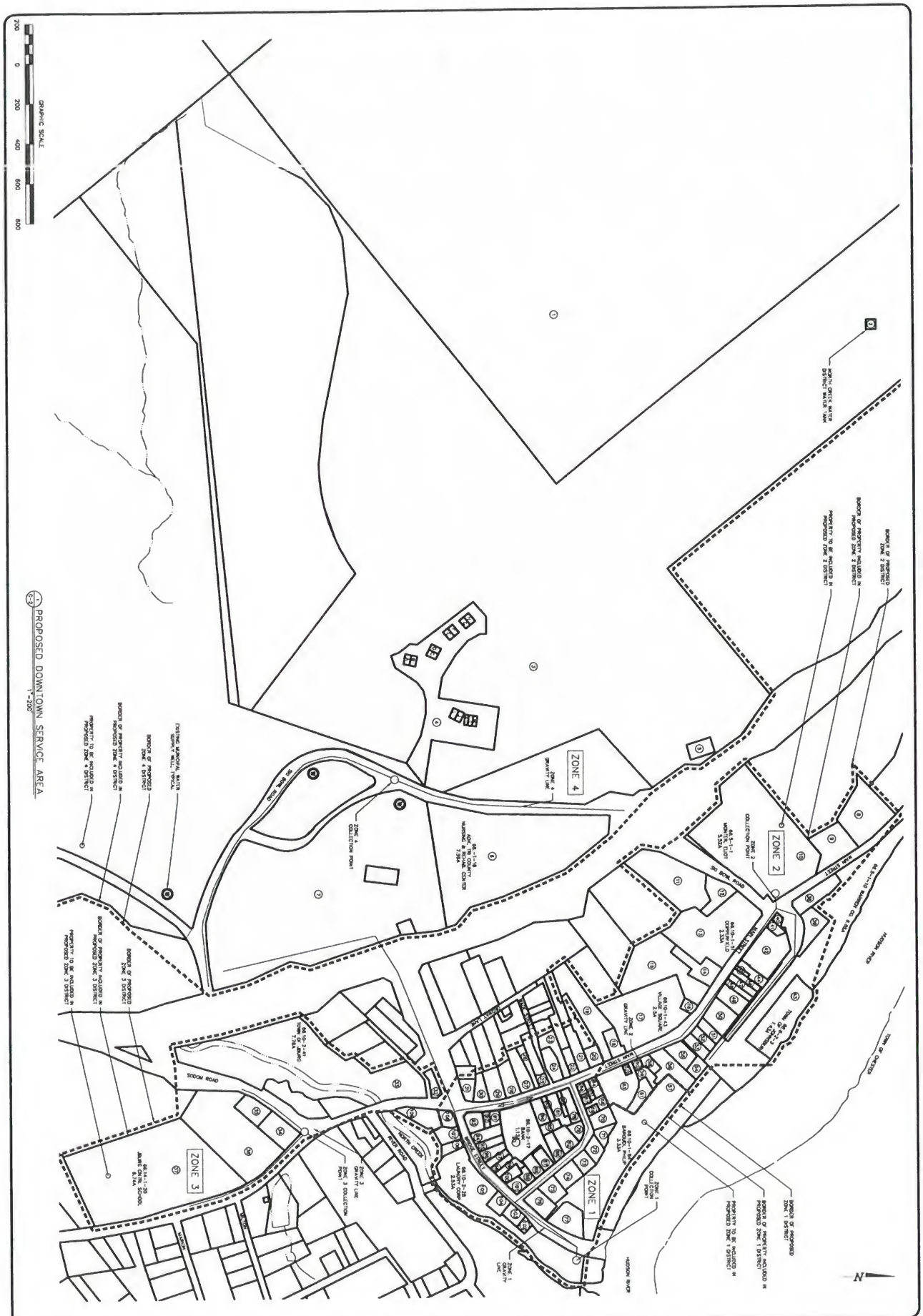
Table 8-6 – Estimated Annual User Fees – Phase II

Grant Funding	Construction Debt	Annual O&M Fees	Annual Sewer Cost	Total User Fees
0%	$300,466	$233,000	$533,466	$800
10%	$270,420	$233,000	$503,420	$754
20%	$240,374	$233,000	$473,374	$708
30%	$210,328	$233,000	$443,328	$662
40%	$180,282	$233,000	$413,282	$616
50%	$150,236	$233,000	$383,236	$570
60%	$120,190	$233,000	$353,190	$524
70%	$90,144	$233,000	$323,140	$478
80%	$60,098	$233,000	$293,098	$432
90%	$30,052	$233,000	$263,052	$386
100%	$0	$233,000	$233,000	$345

9 CONCLUSIONS AND RECCOMENDATIONS



C-1	MAP, PLAN, AND REPORT PROPOSED SEWER DISTRICT	TOWN OF JOHNSBURG 219 MAIN STREET JOHNSBURG NEW YORK WARREN COUNTY	REVISIONS: NO: DATE: DESCRIPTION:	PROJECT INFORMATION: DATE: 7/25/16 SCALE: 1"=500' DESIGNED BY: MJS DRAWN BY: JC REVIEWED BY: TSS PROJECT NO.: 15-028 SHEET: 1 OF 3	CEDARWOOD ENGINEERING SERVICES PLLC



C-2

MAP, PLAN, AND REPORT
PROPOSED DOWNTOWN
SERVICE AREA

TOWN OF JOHNSBURG

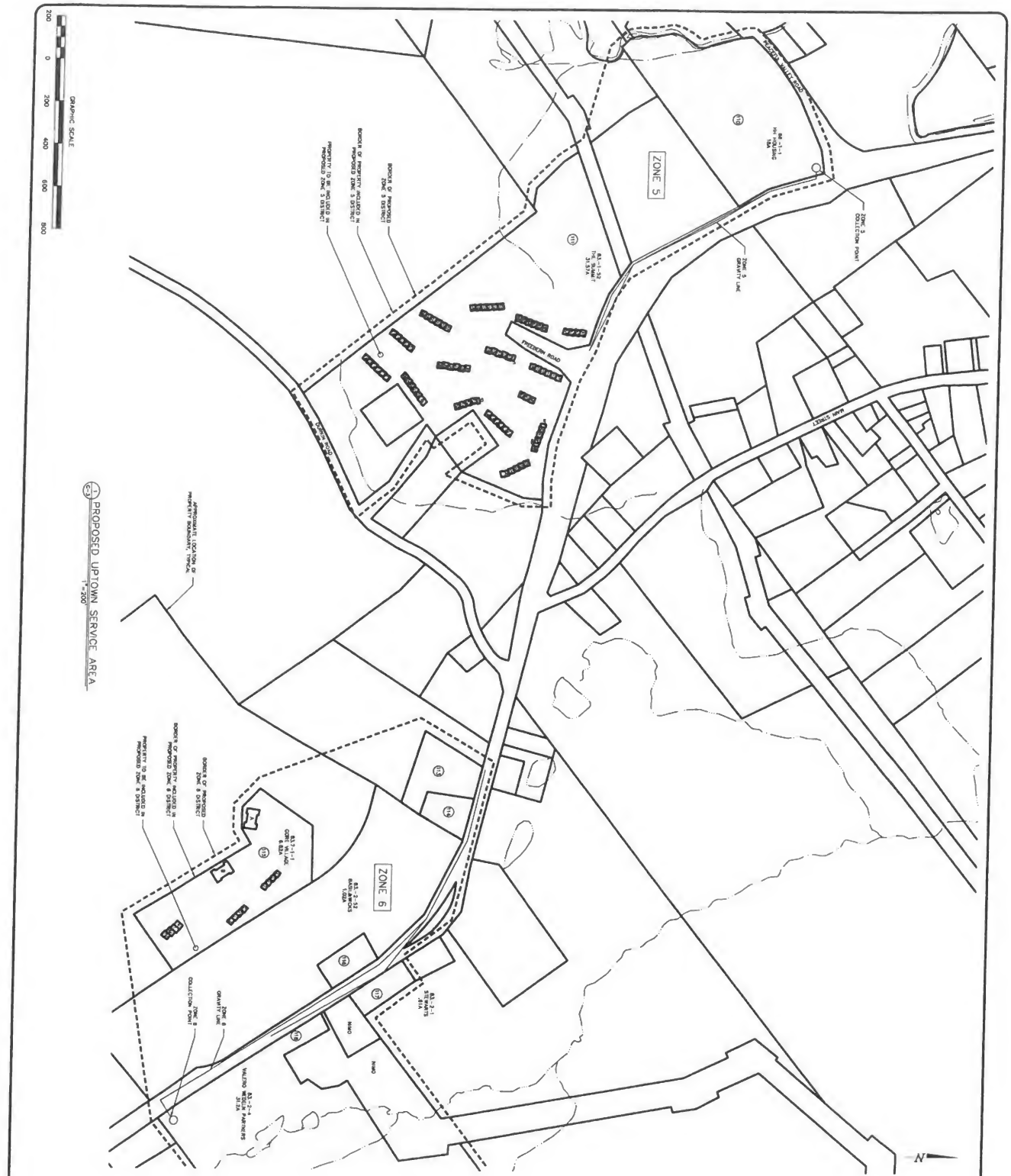
219 MAIN STREET

JOHNSBURG NEW YORK
WARREN COUNTY

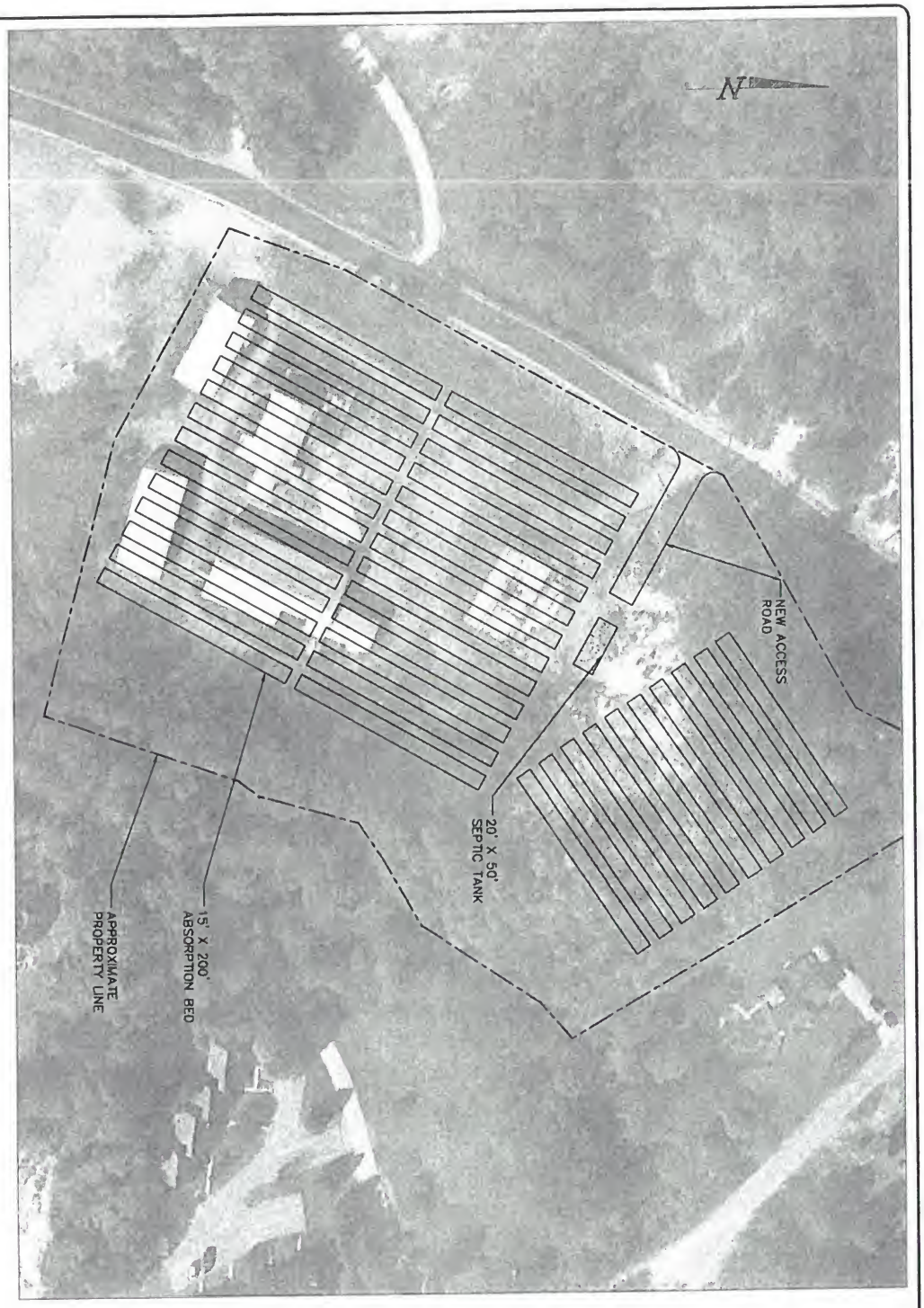
REVISIONS:		
NO:	DATE:	DESCRIPTION:

PROJECT INFORMATION:	
DATE:	7/25/16
SCALE:	1" = 200'
DESIGNED BY:	MJS
DRAWN BY:	JC
REVIEWED BY:	TSS
PROJECT NO.:	15-028
SHEET:	2 OF 3

CEDARWOOD ENGINEERING SERVICES PLLC



C-3	MAP, PLAN, AND REPORT PROPOSED UPTOWN SERVICE AREA	TOWN OF JOHNSBURG 219 MAIN STREET JOHNSBURG NEW YORK WARREN COUNTY	REVISIONS: NO: DATE: DESCRIPTION:	PROJECT INFORMATION: DATE: 7/25/2016 SCALE: 1" = 200' DESIGNED BY: WJS DRAWN BY: JC REVIEWED BY: TSS PROJECT NO.: 15-028 SHEET: 3 OF 3	CEDARWOOD ENGINEERING SERVICES PLLC

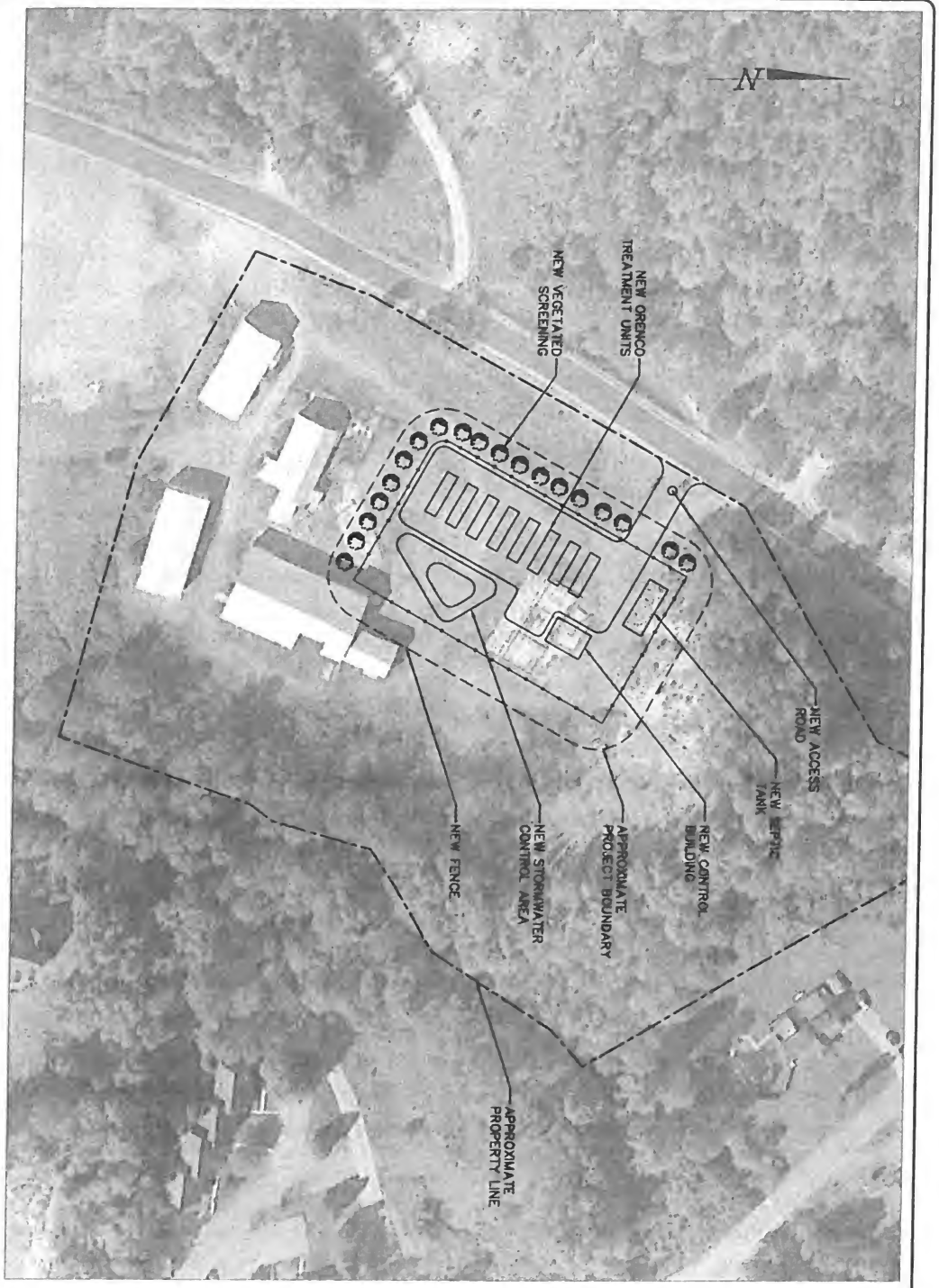


100 0 100 200 300 400

GRAPHIC SCALE

1 / D-2 SITE PLAN
1"=100'

D-2	MAP, PLAN, AND REPORT PHASE I – OPTION 1 SITE PLAN	TOWN OF JOHNSBURG 219 MAIN ST TOWN OF JOHNSBURG NEW YORK WARREN COUNTY	REVISIONS: NO: DATE: DESCRIPTION:	PROJECT INFORMATION: DATE: 7/25/2018 SCALE: 1" = 100' DESIGNED BY: MJS DRAWN BY: GR REVIEWED BY: TSS PROJECT NO.: 15-038 SHEET: 2 OF 17	CEDARWOOD ENGINEERING SERVICES PLLC



GRAPHIC SCALE

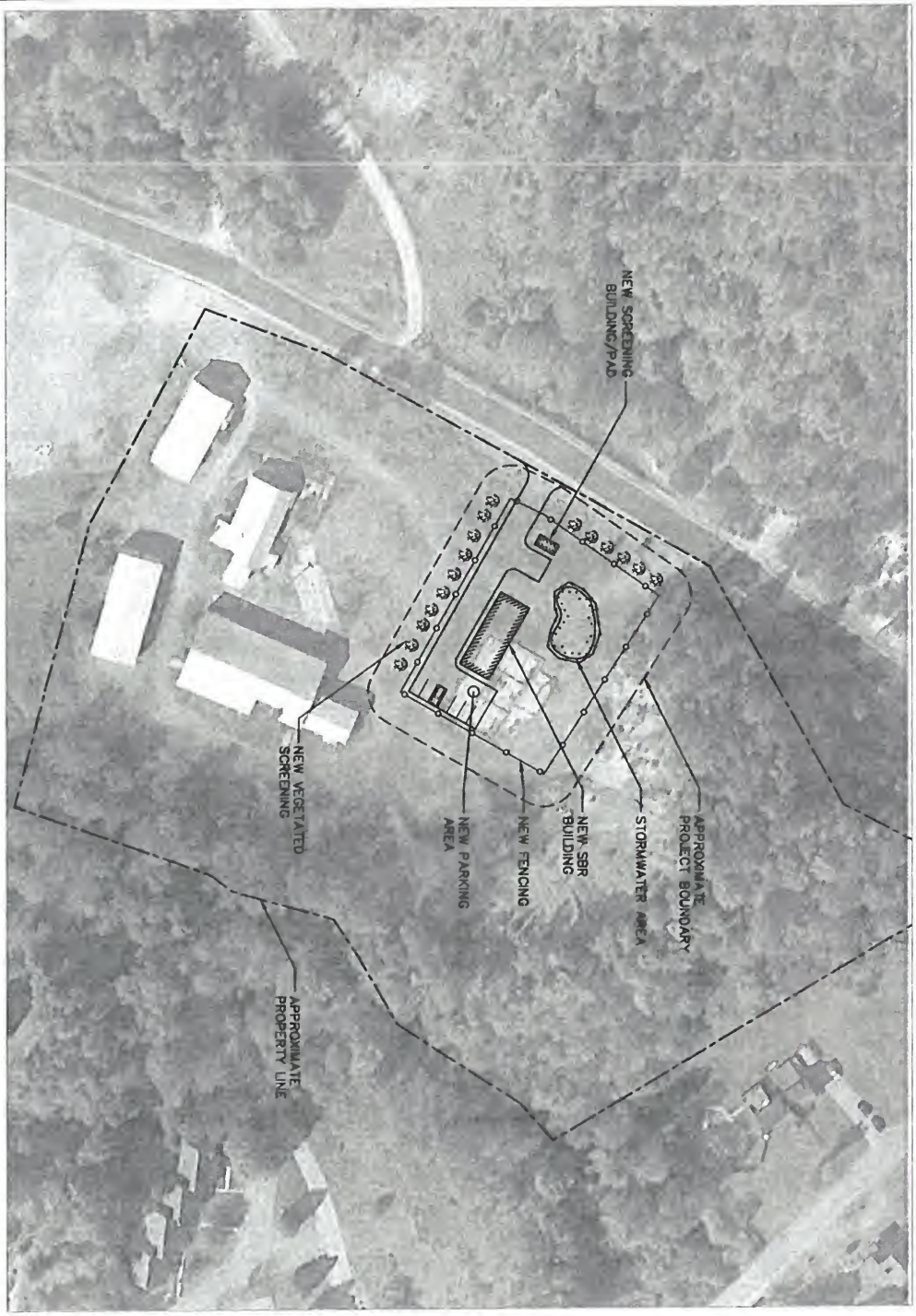
100 0 100 200 300 400

1/D-4 SITE PLAN

1"=100'

D-4	MAP, PLAN, AND REPORT PHASE I OPTION 2 SITE PLAN	TOWN OF JOHNSBURG 219 MAIN ST TOWN OF JOHNSBURG NEW YORK WARREN COUNTY	REVISIONS: NO. / DATE: / DESCRIPTION: PROJECT INFORMATION: DATE: 8/4/2016 SCALE: 1" = 100' DESIGNED BY: MS DRAWN BY: GR REVIEWED BY: TS PROJECT NO.: 15-029 SHEET: 2 OF 17

CEDARWOOD ENGINEERING SERVICES PLLC



100 0 100 200 300 400

GRAPHIC SCALE

1 D-6 SITE PLAN

1" = 100'

D-6

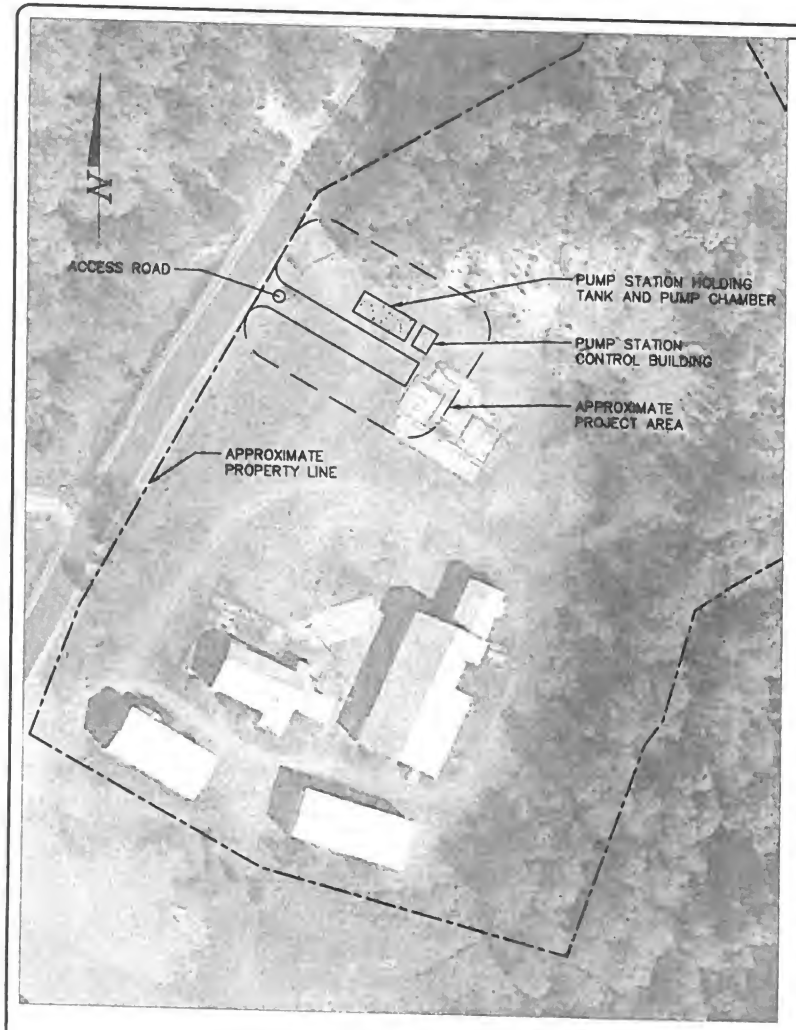
MAP, PLAN, AND REPORT
PHASE I OPTION 3
SITE PLAN

TOWN OF JOHNSBURG
219 MAIN ST
TOWN OF JOHNSBURG NEW YORK
WARREN COUNTY

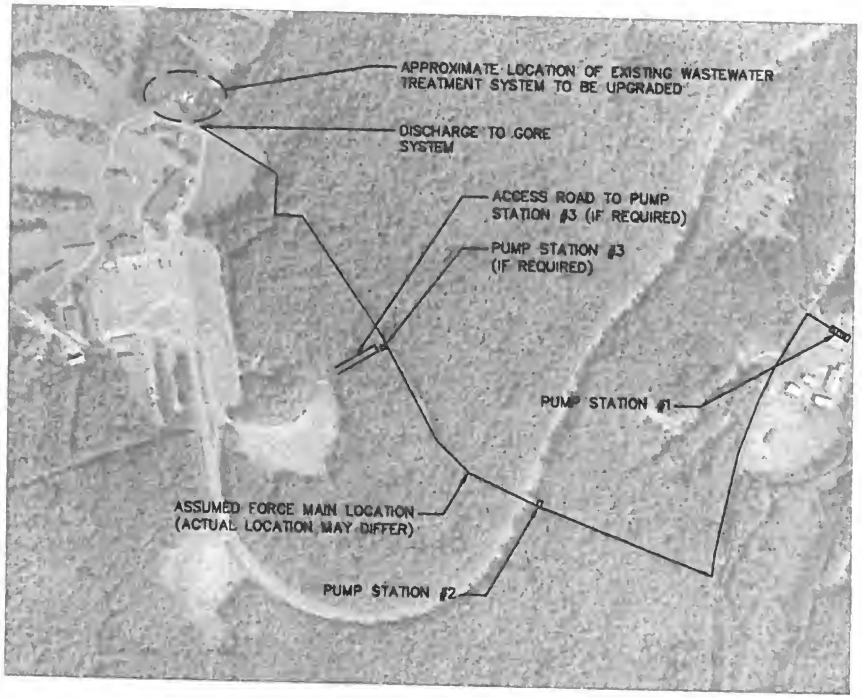
REVISIONS:		
NO:	DATE:	DESCRIPTION:

PROJECT INFORMATION:	
DATE:	7/25/2018
SCALE:	1" = 100'
DESIGNED BY:	MB
DRAWN BY:	GR
REVIEWED BY:	TS
PROJECT NO.:	18-028
SHEET:	8 OF 17

CEDARWOOD ENGINEERING SERVICES PLLC



1 D-8 SITE PLAN
1"=100'



2 D-8 FORCE MAIN
1"=200'

GRAPHIC SCALE

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CEDARWOOD ENGINEERING SERVICES PLLC

REVISIONS
NO. DATE: DESCRIPTION:

PROJECT INFORMATION:
DATE: 7/25/2019
SCALE: 1" = 100'
DESIGNED BY: MJS
DRAWN BY: GR
REVIEWED BY: TSS
PROJECT NO.: 19-088
SHEET: 8 OF 17

TOWN OF JOHNSBURG
219 MAIN ST
TOWN OF JOHNSBURG WARREN COUNTY NEW YORK

MAP, PLAN, AND REPORT
PHASE I OPTION 4
SITE PLAN

D-8